

Claims

1. An optical semiconductor device comprising:

a plurality of light-receiving elements comprised of a semiconductor region of a first conductivity type and a semiconductor region of a second conductivity type formed on the semiconductor region of the first conductivity type;
an isolation region formed by burying an insulator or a dielectric in a trench which passes through the semiconductor region of the second conductivity type and which reaches the semiconductor region of the first conductivity type in order to isolate the respective light-receiving elements from one another;

an electrode formed on the isolation region; and

a contact portion formed by burying a conductor in an opening which passes through the isolation region and which reaches the semiconductor region of the first conductivity type in order to electrically connect the electrode and the semiconductor region of the first conductivity type.

2. The optical semiconductor device of claim 1, wherein the contact portion formed by burying the conductor in the opening is located so as to surround each light-receiving element.

3. The optical semiconductor device of claim 1, wherein the semiconductor region of the first conductivity type comprises an upper layer, a middle layer, and a lower layer, the middle layer contains a higher concentration of impurity of the first conductivity type than the upper and lower layers do, and the opening in which the conductor is buried is formed so as to reach the middle layer of the semiconductor region of the first conductivity type.

4. The optical semiconductor device of claim 1, wherein a high-concentration region, which contains a higher concentration of impurity of the first conductivity type than the semiconductor region of the first conductivity type does, is provided directly under the conductor.

5. The optical semiconductor device of claim 2, wherein a high-concentration region, which contains a higher concentration of impurity of the first conductivity type than the semiconductor region of the first conductivity type does, is provided directly under the conductor.

6. The optical semiconductor device of claim 3, wherein a high-concentration region, which contains a higher concentration of impurity of the first conductivity type than the semiconductor region of the first conductivity type does,

is provided directly under the conductor.

7. The optical semiconductor device of claim 1, wherein the conductor is doped polysilicon or tungsten.

8. The optical semiconductor device of claim 2, wherein the conductor is doped polysilicon or tungsten.

9. The optical semiconductor device of claim 3, wherein the conductor is doped polysilicon or tungsten.

10. The optical semiconductor device of claim 4, wherein the conductor is doped polysilicon or tungsten.

11. The optical semiconductor device of claim 5, wherein the conductor is doped polysilicon or tungsten.

12. The optical semiconductor device of claim 6, wherein the conductor is doped polysilicon or tungsten.

13. The optical semiconductor device of claim 1, wherein a circuit connected to the light-receiving element is included on the semiconductor region of the first conductivity type other than the light-receiving element-formed region.

14. The optical semiconductor device of claim 2, wherein a circuit connected to the light-receiving element is included on the semiconductor region of the first conductivity type other than the light-receiving element-formed region.

15. The optical semiconductor device of claim 3, wherein a circuit connected to the light-receiving element is included on the semiconductor region of the first conductivity type other than the light-receiving element-formed region.